

REMARKS

Reconsideration of the above referenced application as amended is respectfully requested.

Election/Restriction

The Examiner has required restriction under 35 USC § 121 between Group I claims 1-15 and 17-20 and Group II claims 16 and 21.

Applicants hereby affirm their provisional election, with traverse, of Group I claims 1-15 and 17-20.

Group I claims are directed to a system located downstream of an engine, the catalytic converter system suitable for catalyzing the conversion of hydrocarbons, carbon monoxide, nitrogen oxides and other pollutants contained in an exhaust gas stream. The method of Group II claims is directed to reducing the pollutant emissions in the exhaust gas of an internal combustion engine.

Claims of Group I, such as claim 4 are directed to an embodiment which wherein there is a muffler at the muffler position and a tailpipe downstream of the muffler in a tailpipe position. The low temperature conversion catalyst is disposed at the tailpipe position downstream of the muffler position.

Therefore, the method of the Group II claims is designed to be used in combination with the apparatus of the Group I claims. Furthermore, as indicated in the preamble of claim 1, the catalytic converter of Group I is designed to be used in accordance with the method of Group II.

The Examiner has cited M.P.E.P. § 806.05 (e) in support of the restriction requirements. The comments in the cited M.P.E.P. indicate that the burden is on the Examiner to cite reasonable examples that show material differences. The Examiner has cited no such reasonable examples to support the asserted differences between the Group I and II claims. The Examiner has merely stated a conclusion that, "In this case, the apparatus as claimed can be used to practice another and materially different process, such as the process of manufacturing a chemical compound."

The Examiner's unsupported conclusion is insufficient to overcome the recited burden. The catalytic converter in Group I is designed to catalyze exhaust gases. The method of the Group II is designed to reduce pollutant emissions in exhaust gases. It is not apparent what chemical processes the catalytic converter can be use for or what chemical compounds the Examiner can be referring to.

Accordingly, reconsideration of the restriction requirement is respectfully requested.

In the Specification:

The specification was objected to at Section 7. at page 3 of the Office Action. Applicants have made an earnest effort to amend all of the objected to language. The proposed amendments to the specification raise no new issues and introduce no new matter. Therefore, entry of the proposed amendments and withdrawal of the objection is respectfully requested.

Drawings

Applicants note the requirement for formal drawing, which will be submitted prior to or at allowance of the application.

35 USC § 112

Claims 1-15 and 17-20 have been rejected under 35 USC § 112, first paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

It is asserted that with respect to claim 1, it is unclear as to what structural limitation is intended by the word "material" at line 5. Accordingly, claim 1 as well various of the other claims have been amended to delete the word "material".

It is also asserted that in claim 1, line 12 the position of the hydrocarbon adsorbent with respect the other elements of the system is unclear. Accordingly, claim 1 has been amended to include

language to more clearly indicate the position of the various elements. Basis for the amendments to claim 1 is found at page 10, lines 9-17.

Accordingly, claims 1-15 and 17-20 particularly point out and distinctly claim the subject matter Applicants regard as the invention.

It is asserted that claim 2 is unclear as to how the refractory carrier is related to the refractory support material set forth in claim 1, line 7. The term refractory as been deleted from claim 1. Accordingly, in claim 1 the catalytic converter comprises the support material and the platinum group metal. In claim 2 the catalyst is deposited on a refractory carrier. Accordingly, claim 2 is clear and consistent with claim 1.

Claim 3, as well as claim 8, have been rejected as being unclear. Claim 3 has been amended to recite a more specific embodiment. Basis for the amendment to claim 3 is in the specification at page 11, line 24. Furthermore, claim 3 has been amended to change "in the" with "at a" to avoid the rejection based on lack of antecedent basis.

Claim 4 has been rejected as lacking clarity as to whether the applicants are attempting to claim the catalytic converter or the combination of the catalytic converter and the tailpipe. Claim 4 has been amended to more clearly indicate the location of the converter system. Basis is in the specification at pages 10 and 11 and Figures 1 and 3.

Claim 5, line 3, and also claims 18-19/5, were indicated to be unclear with regard to how titania related to the refractory support material set forth in claim 1. Claim 5 has been amended to indicate that titania is a support material for the platinum. Basis is in the specification at page 12, line 6. Claim 1 has been amended to delete "refractory" before "support material".

In claim 5, the structural limitation is the specific embodiment of the low temperature catalyst and the hydrocarbon adsorbent material recited in amended claim 5. In claim 5, line 7 T(50) is preceded by an indefinite article, "a" and therefore is used for the first time in the claims to characterize the adsorbent

material. Basis in the specification is found at page 22, beginning at line 23.

In claim 5 the word "it" has been indicated to be vague and indefinite. The word "it" has been deleted as part of the amendment.

Claims 8 and 14 were indicated to be unclear with regard to how the muffler plates are related to the refractory carrier and the refractory material in claim 1. Claim 1 has been amended to delete the term refractory. Claims 8 and 14 are directed to embodiments wherein the low temperature conversion catalyst and said adsorbent material are disposed in separate layers on muffler plates.

Claims 10-13 and 18 have been amended to delete "-type" as suggested by the Examiner. In claim 10 the language relating to cell walls has been corrected.

For the above reasons, withdrawal of the rejection of the claims under 35 USC § 112 is respectfully requested.

Rejection under 35 USC § 102 and § 103

Claims 1-21 have been rejected as anticipated or obvious over various of the following references taken alone or together:

1. EP 747,581 (EP' 581)
2. WO 96/39244 (WO' 244)
3. WO 97/00119 (WO' 119)
4. EP 602,963 (EP' 963)
5. US 5,218,817 (Urata)
6. US 3,675,398 (Giarriizzo)
7. US 5,078,979 (Dunne).

For the reasons that follow, reconsideration of the amended claims and withdrawal of the rejections over the cited art is respectfully requested.

The Present Invention

The present invention is defined by claims 1-21 as amended. Briefly, the present invention is directed to a low temperature catalytic converter system and related method. The system is designed to have a catalyst at a location which is at a relatively low temperature which is never in excess of 550°C (claim 1), more specifically 500°C (claim 14), and yet in more specific embodiments 300°C (claim 15). Specific embodiments have the catalyst located at the muffler position or the tailpipe position. (claims 3, 4) In order to be effective the catalyst has a light-off temperature of less than about 200°C and in more specifically 100°C, and yet in more specific embodiments 70 to 100°C. (claims 1, 20, 21) As indicated in the specification at page 11, lines 6-7, the light-off temperature is the temperature at which the catalyst material attains fifty percent conversion performance. (Spec. p. 11, lines 6, 7) The catalyst is used in combination with a hydrocarbon adsorbent material. The adsorbent material is capable of desorbing the adsorbed hydrocarbons when the temperature of the low temperature catalyst has exceed the light-off temperature. (claim 1) Preferably, the adsorbent material and the low temperature catalyst can be located on one refractory carrier. (claim 2)

Optionally, there can be an upstream conversion catalyst located to be exposed to temperatures in excess of 650°C. (claim 1)

Finally, reference is made to the unexpected results illustrated in the Examples. In particular, reference is made to the results presented in Example 4.

Rejection under 35 USC § 102

Claims 1-2, and 10-11 have been rejected under 35 USC § 102(b) as being anticipated by EP 747,581 (EP'581).

This reference is cited as disclosing a catalytic reactor system comprising a supported platinum catalyst and a hydrocarbon adsorbent deposited on a refractory carrier. Page 3, line 59 is

cited as disclosing a gas inlet temperature of between 40 and 300°C. Page 2, lines 55-59; and page 3, lines 18-22 are cited as disclosing that the catalyst and adsorbent are disposed in separated layers or same layer deposited on the cell walls of a honey comb configuration.

A review of the reference shows it to be directed to predrying a catalyst/hydrocarbon trap system. There is no disclosure to locate a low temperature catalyst downstream of an engine never to be exposed to a temperature in excess of 550°C. As indicated in EP'581 the catalyst/trap system is designed for start-up. The gas inlet temperature of between 40 and 300°C referred to by the Examiner was for a synthetic exhaust gas. Where the system was tested on an engine (Test 10, at page 10) no such temperature limitation is disclosed. The catalyst of EP'581 is not disclosed to be located downstream of an engine never to be exposed to a temperature in excess of 550°C.

Accordingly, withdrawal of the opinion that any of the claims 1-2, and 10-11 as anticipated by EP 747,581 is respectfully requested.

Claims 1-2, 10-11, (17-19)/1 have been rejected under 35 USC § 102(b) as being anticipated by WO 96/39244 (WO'244).

This reference is cited as disclosing a catalytic reactor system comprising a supported platinum catalyst and a hydrocarbon adsorbent deposited on a refractory carrier at page 6, lines 10-22. The gas inlet temperature is cited as being between 150 and 200°C. With respect to claims 2, 10-11, (18-19)/17/1, WO 96/39244 is cited as disclosing at page 6, lines 19-22; and page 7, lines 8-12 that the catalyst and adsorbent are disposed in separated layers or same layer deposited on the cell walls of a honey comb configuration.

A review of the reference shows it to be directed to a lean NOx catalyst and a hydrocarbon adsorbent. There is no disclosure to locate a low temperature catalyst downstream of an engine never to be exposed to a temperature in excess of 550°C. As indicated in WO'244 the catalyst/trap system is designed so that "during the lower exhaust temperature parts of the engine operating cycle, the

adsorbent adsorbs unburned fuel, and during the higher exhaust gas temperature parts of the operating cycle..."

The gas inlet temperature of between 150 and 200°C (page 8, lines 5-8, Figure 2) referred to by the Examiner was disclosed, but during this range "there is very low conversion of NO and HC." (Page 8, line 7). This is contrary to the use of a low temperature conversion catalyst in the present invention which has a light-off temperature of less than about 200°C. The goal of the present invention is to achieve significant conversion below 200°C.

Accordingly, withdrawal of the opinion that any of the claims 1-2, 10-11, (17-19)/1 as anticipated by WO 96/39244 is respectfully requested.

Claims 1-2, 10-11, (17-19)/1 have been rejected under 35 USC § 102(b) as being anticipated by WO 97/00119 (WO'119).

This reference is cited at page 6, lines 10-22 as disclosing a catalytic reactor system comprising a supported platinum catalyst and a hydrocarbon adsorbent deposited on a refractory carrier. Page 30, line 5 is cited as disclosing a gas temperature of between 200 and 400°C. Page 19, lines 2-10 is cited as disclosing that the catalyst and adsorbent are disposed in separated layers or same layer deposited on the cell walls of a honey comb configuration. With respect to claim 17/1, WO'119 is cited at disclosing the specific amount of platinum group metal of 1-200g/ft<sup>3</sup>.

A review of the reference shows it to be directed to a catalyst/hydrocarbon trap system which oxidizes gaseous hydrocarbons and carbon monoxide without the substantial conversion of SO<sub>2</sub> to SO<sub>3</sub>. There is no disclosure to locate a low temperature catalyst downstream of an engine never to be exposed to a temperature in excess of 550°C. The gas inlet temperature of between 200 and 400°C (page 30, line 5) referred to by the Examiner was disclosed, but during this range Table 2 of WO'119 shows that there is very low conversion of HC at 200°C. (Page 30, lines 7-15) This is contrary to the use of a low temperature conversion catalyst in the present invention which has a light-off temperature of less than about 200°C.

Accordingly, withdrawal of the opinion that any of the claims lack of novelty and/or lack of inventive step based on WO'119 is respectfully requested.

Rejection under 35 USC § 103

Claims 1-2, 6, 10-11, (16-19)/1 have been rejected as obvious over EP 602,963 (EP'963). For the reasons that follow reconsideration and withdrawal of the rejection is respectfully requested.

This reference is cited as disclosing a catalytic reactor system comprising a supported platinum catalyst and a hydrocarbon adsorbent deposited on a refractory carrier. Page 6, line 28-29 is cited as disclosing that although the catalyst is preferably placed near the engine exhaust port, it may be placed at any other position in the exhaust pipe. The Examiner concludes that it would be obvious to one of ordinary skill in the art to select an appropriate location for the catalyst based on the teaching of EP'963 since it has been held that rearranging parts of an invention involves only routine skill in the art. Page 4, lines 18-39, and page 5, lines 2-3 are cited as disclosing that the catalyst and adsorbent are disposed in separated layers or same layer deposited on the cell walls of a honey comb configuration.

A review of the reference shows it to be directed to a cold start catalyst/hydrocarbon trap system. There is no disclosure to locate a low temperature catalyst downstream of an engine never to be exposed to a temperature in excess of 550°C. Furthermore, the disclosure suggests that "may" be arbitrarily located at any position, it is not obvious that it would be operative at any position, particularly at regions that are never to be exposed to a temperature in excess of 550°C as presently claimed. Other than this speculation, EP'963 teaches that, "it is preferably located at a position relatively near to an engine exhaust port". Furthermore, the catalysts disclosed in EP'963 have a "catalyst light-off at a low temperature of about 200°C". (Page 5, lines 20-21) The low



temperature catalyst of the present invention has a light-off temperature of less than about 200°C.

EP'963 does not contemplate the low temperature system of the present invention. The goal of the present invention is to achieve significant conversion below 200°C.

Accordingly, withdrawal of the rejection that any of the claims 1-2, 6, 10-11, (16-19)/1 as obvious based on EP'963 is respectfully requested.

Claims 3-4, 8-9, 12-15, (16-19)/(3-4) have been rejected as obvious over WO 97/00119 (WO'119), EP 602,963 (EP'963), or WO 96/39244 (WO'244) in view of US 5,218,817 (Urata) and US 3,675,398 (Giarrizzo). For the reasons that follow reconsideration and withdrawal of the rejection is respectfully requested.

Initially, reference is made to the above discussion distinguishing the WO 97/00119 (WO'119), EP 602,963 (EP'963), and WO 96/39244 (WO'244).

US 5,218,817 (Urata) is cited as showing that catalyst may be placed in the tail pipe or muffler. However, Urata is directed to the placement of a catalyst in the exhaust pipe of an engine for a small generator, industrial machines or the like having a short exhaust system. There is no disclosure of the temperatures or other conditions to which the catalyst is exposed. Furthermore, there is no disclosure that such a catalyst would never be exposed to a temperature in excess of about 550°C. Accordingly, there is no basis to combine Urata with any of WO'119, EP'963 or WO'244 to make obvious any of the embodiments presently claimed.

US 3,675,398 (Giarrizzo) is also cited as showing that catalyst may be placed in the tail pipe or muffler. However, Giarrizzo is directed to the placement of a filter at the exhaust pipe of an engine for a motor vehicle. There is no disclosure or suggestion that Giarrizzo can be used with the claimed low temperature catalyst or adsorbent. Furthermore, there is no disclosure that such a catalyst is a low temperature conversion catalyst of the present invention which has a light-off temperature of less than about 200°C. Accordingly, there is no basis to combine

Giarrizzo with any of WO'119, EP'963 or WO'244 to make obvious any of the embodiments presently claimed.

Accordingly, withdrawal of the rejection that any of claims 3-4, 8-9, 12-15, (16-19)/(3-4) have been rejected as obvious over WO'119, EP'963, or WO'244 in view of Urata and Giarrizzo as obvious is respectfully requested.

Claims 5-7 (16-19)/5 have been rejected as obvious over WO 97/00119 (WO'119), EP 602,963 (EP'963), or WO 96/39244 (WO'244) in view of US 5,078,979 (Dunne). For the reasons that follow reconsideration and withdrawal of the rejection is respectfully requested.

Initially, reference is made to the above discussion distinguishing the WO 97/00119 (WO'119), EP 602,963 (EP'963), and WO 96/39244 (WO'244).

Dunne is cited as disclosing an adsorbent as presently claimed in certain embodiments. However, there is no motivation for one skilled in the art to combine Dunne with any of WO'119, EP'963 or WO'244 to make obvious any of the embodiments presently claimed. In certain of the cited references, it is desirable to use adsorbents which trap hydrocarbons to be desorbed at higher temperatures than disclosed in Dunne. Furthermore, even in embodiments of the present invention, the light-off temperature can be above the 150°C - 200°C desorption temperature limit of Dunne. Additionally, there is no disclosure in Dunne to locate the catalyst so as to never be exposed to a temperature in excess of about 550°C. Therefore, for the reason discussed above with regard to the primary references the disclosure of the adsorbents in Dunne can not be combined with such references to obviously achieve the presently claimed invention.

Accordingly, withdrawal of the rejection that any of claims 5-7 (16-19)/5 have been rejected as obvious over WO'119, EP'963, or WO'244 in view of US 5,078,979 to Dunne as obvious is respectfully requested.

Claims 5, (17-19)/5 have been rejected as obvious over WO 97/00119 (WO'119) or WO 96/39244 (WO'244) in view of US 5,078,979 (Dunne). For the reasons that follow reconsideration and withdrawal of the rejection is respectfully requested.

Reference is made to the above discussion distinguishing the WO 97/00119 (WO'119), and WO 96/39244 (WO'244) in view of Dunne. The same comments apply.

Claim 6 has been rejected as obvious over EP 747,581 (EP'581), WO 97/00119 (WO'119) or WO 96/39244 (WO'244) in view of EP 602,963 (EP'963). For the reasons that follow reconsideration and withdrawal of the rejection is respectfully requested.

Initially, reference is made to the above discussion distinguishing the cited references. Additionally, there is no disclosure or suggestion in EP'963 to combine the presently claimed low temperature conversion catalyst with the presently claimed upstream conversion catalyst in any of the references. The catalyst of the present invention is located in the exhaust stream based on the recited temperature parameters. As reviewed above, this structure is not disclosed or suggested in the cited references taken separately, and there is nothing to in the combination to add the missing elements which are presently claimed.

Claim 7 has been rejected as obvious over EP 747,581 (EP'581), WO 97/00119 (WO'119) or WO 96/39244 (WO'244) in view of US 5,078,979 (Dunne) as applied to claim 5 above and further in view of EP 602,963 (EP'963).

Reference is made to the above discussion distinguishing the WO 97/00119 (WO'119), and WO 96/39244 (WO'244) in view of Dunne, regarding EP'963. The same comments apply with regard to claim 7.

Claims 3-4, 8-9 12-15, 16/(3-4) have been rejected as obvious over EP 747,581 (EP'581) in view of US 5,218,817 (Urata) and US 3,675,398 (Giarrizzo).

Reference is made to the above discussion distinguishing the EP 747,581 (EP'581) as well as the comments relating to Urata and Giarrizzo. The same comments apply taking EP'581 with Urata and Giarrizzo.

Claim 5 has been rejected as obvious over EP 747,581 (EP'581) in view of US 5,078,979 (Dunne).

Reference is made to the above discussion distinguishing EP'581 in view of Dunne. The same comments apply with regard to claim 5.

Claims (17-20)/1 have been rejected as obvious over EP 747,581 (EP'581) in view of WO 97/00119 (WO'119) or WO 96/39244 (WO'244) or EP 602,963 (EP'963)

Reference is made to the above discussion distinguishing EP'581 as well as (WO'119), (WO'244) and (EP'963). The same comments apply with regard to claims (17-20)/1.

Claims (17-20)/(3-4) have been rejected as obvious over EP 747,581 (EP'581) in view of US 5,218,817 (Urata) and US 3,675,398 (Giarrizzo) and further in view of WO 97/00119 (WO'119) or WO 96/39244 (WO'244) or EP 602,963 (EP'963).

Reference is made to the above discussion distinguishing EP'581 as well as (WO'119), (WO'244) and (EP'963) as well as Urata and Giarrizzo. The same comments apply with regard to claims (17-20)/(3-4).

Claims (17-20)/5 have been rejected as obvious over EP 747,581 (EP'581) in view of US 5,078,979 (Dunne) and further in view of WO 97/00119 (WO'119) or WO 96/39244 (WO'244) or EP 602,963 (EP'963).

Reference is made to the above discussion with respect EP'581 as well as Dunne, (WO'119), (WO'244) and (EP'963) as well as Urata and Giarrizzo. The same comments apply with regard to claims (17-20)/5.

Claims (20)/1 has been rejected as obvious over WO 97/00119 (WO'119) or WO 96/39244 (WO'244) or EP 602,963 (EP'963) in view of EP 747,581 (EP'581).

Reference is made to the above discussion with respect to (WO'119), (WO'244) and (EP'963) as well as EP'581. The same comments apply with regard to claims (20)/1.

Claims (20)/(3-4) have been rejected as obvious over WO 97/00119 (WO'119) or WO 96/39244 (WO'244) or EP 602,963 (EP'963) in view of US 5,218,817 (Urata) and US 3,675,398 (Giarrizzo) and further in view of EP 747,581 (EP'581).

Reference is made to the above discussion with respect (WO'119), (WO'244) and (EP'963) as well as Urata, Giarrizzo and EP'581. The same comments apply with regard to claims (20)/(3-4).

08/997,774 (3940/3928)  
AMENDMENT  
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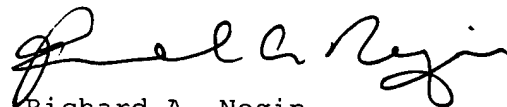
Claim (20)/5 has been rejected as obvious over WO 97/00119 (WO'119) or WO 96/39244 (WO'244) or EP 602,963 (EP'963) in view of US 5,078,979 (Dunne) and further in view of EP 747,581 (EP'581).

Reference is made to the above discussion with respect (WO'119), (WO'244) and (EP'963) as well as Dunne and EP'581. The same comments apply with regard to claim (20)/5.

For the above reasons, presently presented claims 1-21 are not suggested or disclosed in the cited combination of references and withdrawal of the rejection under 35 USC § 103 is respectfully requested.

The application is believed in condition for allowance and such action is respectfully requested. If the Examiner disagrees or believes that for any reason direct contact with Applicants' attorney would advance the prosecution of this application to finality, the Examiner is invited to telephone the undersigned attorney at the number given below.

Respectfully submitted,



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